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Diagrams showing the positions of Jupiter's Satellites VI and VII from Photographs taken at the Royal Observatory, Greenwich, during the Oppositions of 1905–6 *and* 1906–7. (Plates 4, 5.)

(*Communicated by the Astronomer Royal.*)

These diagrams are a graphical representation of the observations of Jupiter's Satellites VI and VII from photographs taken at the Royal Observatory with the 30-inch Reflector during the Oppositions of 1905–6 and 1906–7, printed in the *Monthly Notices*, vol. lxvi. p. 438 and vol. lxvii. p. 479.

During the 1905–6 opposition eighty-six photographs of J. VI were secured on thirty-six nights from 1905 August 23 to 1906 February 15—a period of 177 days. Of J. VII nineteen photographs were secured on fifteen nights from 1905 October 22 to 1906 January 26—a period of 97 days.

The opposition 1906–7 was not so favourable as regards weather conditions, but fifty-six photographs of J. VI were obtained on twenty-eight nights over a period of 222 days, and twelve photographs of J. VII on seven nights over a period of 87 days.

The positions plotted in the diagrams are the mean when more than one photograph was taken on any night. The curves were drawn through these points, but in the case of 1906–7 observations of J. VII the curve is continued beyond the observations to indicate the apparent form.

For comparison, the orbits of the four larger satellites are shown, the major axes being plotted to scale, but the minor axes intentionally exaggerated.

Royal Observatory, Greenwich :
1907 *September* 30.

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On the Measurement of a Meteor Trail on a Photographic Plate.

By H. H. Turner, D.Sc., F.R.S., Savilian Professor.

1. On August 22, 1907, Mr. F. W. Longbottom, of Haslemere, Queen's Park, Chester, sent me the print of a nebula photograph across which a meteor had flashed, asking for advice about the measurement. I have not seen any note on the easiest way of utilising such trails, which have already appeared in a good many photographs, and will doubtless occur in a good many more; and the following method may be found useful in other cases.

2. The rule is simply—measure on any convenient uniform scale, and by any convenient method, the distances of any known stars from the trail. (Three stars are theoretically sufficient, but more will give better results.) These measures will give the desired information.

3. The information obtainable is the position of the pole of the trail. The trail is assumed to be part of a straight line on the plate or of a great circle on the sphere. We cannot determine the radiant from a single trail, only the great circle on which the radiant lies; and this is conveniently specified by its pole, in R.A. and Decl. A_m and D_m say. If we can find other trails belonging to the same radiant, their poles will lie on a great circle of which the radiant is the pole.

4. Let (A, D) be the co-ordinates of the plate centre; (ξ, η) the standard co-ordinates of any point on the plate, *expressed in parts of the radius*, the R.A. and Decl. being (α, δ). If (α, δ) lies on the meteor trail, it is 90° distant from (A_m, D_m), and hence

$$\sin\delta\sin D_m+\cos\delta\cos D_m\cos(\alpha-A_m)=0 \quad . \qquad (1)$$

Now (α, δ) may be expressed in terms of (ξ, η) by the following formulæ (*Monthly Notices*, lxiv. p. 648):—

$$\frac{\cos\delta\sin(\alpha-A)}{\xi}=\frac{\sin\delta}{\sin D+\eta\cos D}=\frac{\cos\delta\cos(\alpha-A)}{\cos D-\eta\sin D} \qquad (2)$$

and since we may re-write (1) in the form

$$d\cos\delta\sin(\alpha-A)+q\sin\delta+r\cos\delta\cos(\alpha-A)=0 \qquad (3)$$

where

$$d=\cos D_m\sin(A_m-A),\ q=\sin D_m,\ r=\cos D_m\cos(A_m-A) \qquad (4)$$

It may also be written

$$d.\xi+q(\sin D+\eta\cos D)+r(\cos D-\eta\sin D)=0 \quad . \qquad (5)$$

or

$$d.\xi+e.\eta+f=0 \quad . \quad . \quad . \quad . \quad . \qquad (6)$$

where q and r are replaced by e and f such that

$$\left.\begin{aligned} e&=q\cos D-r\sin D=\sin D_m\cos D-\cos D_m\sin D\cos(A_m-A)\\ f&=q\sin D+r\cos D=\sin D_m\sin D+\cos D_m\cos D\cos(A_m-A)\end{aligned}\right\} \quad (7)$$

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